

Michigan Department of Natural Resources
Water Quality Division
June, 1980

US EPA RECORDS CENTER REGION 5



406682

An Evaluation of Stream Quality Problems in the
Vicinity of Jones Chemical, Monguagon Creek,
Riverview, Michigan
February, 1980

On February 12, 1980, Jack Bails, Chief, Environmental Enforcement Division, requested by memo, an evaluation of the impacts of unpermitted discharges from Jones Chemical on Monguagon Creek's sediments and aquatic organisms. As requested, the stream was surveyed during the week of February 18, 1980. The impacts of the large upstream Pennwalt Corporation discharge, were of necessity, also evaluated.

FINDINGS

1. The discharge of very high concentrations (more than 1,000 mg/l) of extremely toxic chlorine from Jones Chemical via an unpermitted discharge has severely damaged Monguagon Creek. Macroscopic bottom dwelling stream life was absent downstream from the discharge for at least 0.15 km (kilometers).
2. Toxic heavy metals have been discharged from Jones Chemical as sediment concentrations of zinc (18,000 mg/kg) and lead (920 mg/kg) were markedly elevated below the discharge and were also found at high levels in a discharge sump at the facility
3. One dead and one distressed fish (gizzard shad) were observed in Monguagon Creek below the Jones Chemical discharge. No other fish were observed.
4. The potential for untreated human waste discharges to Monguagon Creek from Jones Chemical was apparent as toilet tissue was observed in the unpermitted discharge containing chlorine. High fecal coliform counts were also found at an in-plant sump connected with the discharge pipe.
5. Suspended solids in runoff from Jones Chemical were high (490 mg/l) and formed an obvious deposit on the bottom of Monguagon Creek.
6. Pennwalt Corporation's discharge upstream of Jones Chemical is apparently the major source of PCB's and oils in Monguagon Creek sediments, and is also a significant source of toxic heavy metals. Most sediment contaminants in areas impacted by the Pennwalt discharge exceeded the U.S. EPA "heavily polluted" levels for dredge spoils.
7. A visible sheen of oil was observed on Monguagon Creek downstream of the Pennwalt Corporation's discharge (006) at all times during the study. This is a violation of their NPDES permit No. MI0002381.
8. The Pennwalt Corporation's discharge caused some damage to Monguagon Creek as indicated by the numbers, kinds and weight of macroscopic bottom dwelling organisms.

Total Zn
Pb 2.7

9. Monguagon Creek, upstream of the Pennwalt Corporation and Jones Chemical discharges, is a degraded stream with limited numbers and kinds of bottom dwelling organisms. Oils and some heavy metals in these sediments exceeded U.S. EPA "heavily polluted" levels but were considerably lower than those found downstream. Urban runoff, oil spills or unknown discharges are possible sources for contaminants.

RECOMMENDATIONS

1. The discharge of chlorine and heavy metals from Jones Chemical to Monguagon Creek should be eliminated or reduced significantly to acceptable concentrations. Sediments in this facility's stormwater runoff should be controlled. Discharge of untreated human wastes to the in-plant sump should cease.
2. The highly contaminated sediments should be removed from Monguagon Creek from Pennwalt's discharge to the Detroit River.
3. The Pennwalt Corporation's waste treatment should be upgraded to meet NPDES permit limits.
4. A sediment and biological survey should be conducted upstream of this Monguagon Creek study area to determine other source(s) of sediment contaminants.

METHODS

Stream bottom dwelling animals (benthic macroinvertebrates), sediments, water and selected discharges of concern in the lower reaches of Monguagon Creek in the vicinity of Jones Chemical and the Pennwalt Corporation were sampled from a boat on February 20, 1980. All samples were maintained in chain of custody.

Five stations were established (Figure 1). Station A was the most upstream station (stream km 1.38) and located outside the area of impact of Pennwalt's discharge (station B - km 1.20). Station C (km 0.75) was immediately upstream of the Jones Chemical discharges while Station D (km 0.68) was immediately downstream. Station E (km 0.53) was further downstream where mixing appeared complete and upstream of other discharges. Storm sewers and runoff from roads, coal piles and the industrialized vicinity enter Monguagon Creek in the 0.53 km before its confluences with the Trenton Channel (Detroit River).

Water samples were handled and preserved according to U.S. EPA approved methods. Analysis for fecal coliform bacteria and suspended solids were completed in the Environmental Protection Bureau (EPB) laboratory in Lansing. Chlorine analysis was completed at the nearby Wayne County Public Works laboratory because of this element's instability over relatively short time periods.

Sediment and benthic macroinvertebrate samples were collected with a petite ponar bottom grab (15 cm x 15 cm). A 250 ml wide mouth bottle of sediment was collected, kept cool and returned to the EPB laboratory for analysis. Single sediment samples were collected near midstream at stations where a point source of pollution was judged not to have an effect along one streambank (stations A, B and E). At stations C and D a sediment sample was collected near each bank (Figure 2).

Figure 1. Location and sampling stations on Monguagon Creek, Wayne County, Michigan, February 20, 1980.

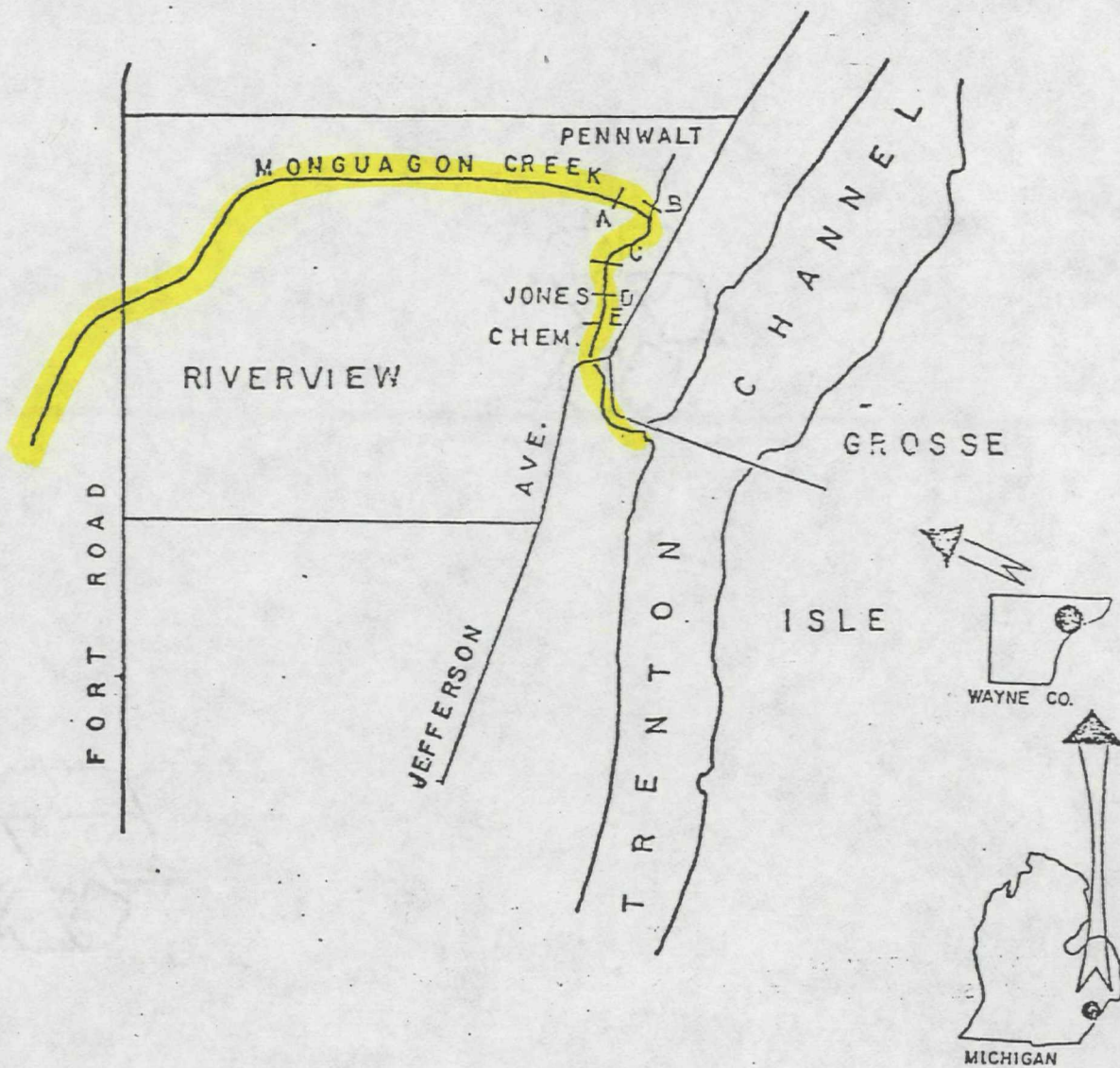
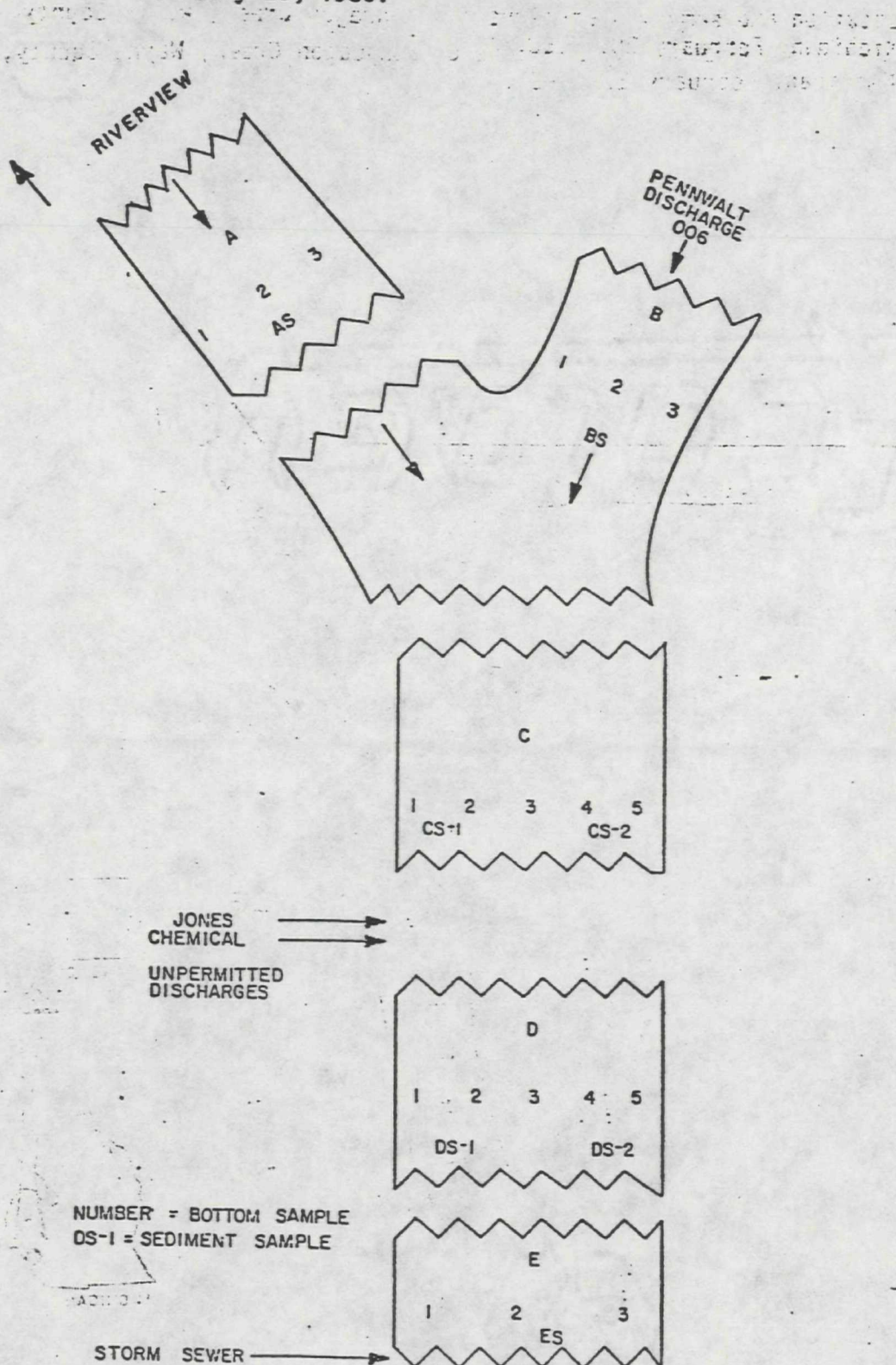


Figure 2. Detailed sampling locations for water, sediments and benthic macroinvertebrates in Monguagon Creek, Wayne County, Michigan, February 20, 1980.



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Macroinvertebrate samples were collected on transects across Monguagon Creek. Samples were collected at points equidistant from the streambanks and each other along the transect. Three macroinvertebrate samples were taken where the stream was relatively narrow (stations A, B and E) while five samples were collected at stations C and D.

Samples taken with the ponar bottom grab were emptied into a small plastic tub to facilitate sample transfer into plastic bags. Samples were kept cool and returned to the Water Quality Division Biology Laboratory where they were washed in a U.S. Standard 30 mesh sieve bucket the following day. Sample remains after sieving were placed in widemouth quart jars and preserved with formalin. Animals were later removed from the sample using a 4x sorting lens, identified and counted with the aid of a dissecting microscope and weighed. All values have been multiplied by a correction factor (43) to convert raw data to numbers or grams weight per square meter. Animals to be weighed were placed on a paper towel for about a minute to remove water and weighed to the nearest 0.01 gram on a Mettler balance Model P162. After weighing, the animals were placed in a permanent storage solution in 4 dram screw top vials and retained under lock and key for further reference if necessary.

At each sampling site a station card was filled out to record general observations and/or conditions at the time. Photographs were also taken upstream and downstream from each sampling station. Photos from stations D and E were not usable because of accidental film exposure.

BACKGROUND

Monguagon Creek is located in southeastern Michigan in Wayne County and flows to the Trenton Channel (Detroit River) near Grosse Ile. The creek is named Huntington Creek on the USGS Wyandotte quadrangle 7.5 minute topographic map of 1973. Although not named on official Michigan County maps, Monguagon Creek is the recognized local name and appears on NPDES discharge permits.

Monguagon Creek is a first order stream (lacks tributaries) and has a total length of about 4.2 km. The once in 10 year 7-day low flow has been estimated at 0.0 m³/day. The stream flows from its headwaters northeast to Riverview then west to the Detroit River. About 1.2 km upstream from its Detroit River confluence, the Pennwalt Corporation discharges 32,700 m³/day of treated wastewater via discharge 006 under an NPDES permit (number MI0002381). A half kilometer downstream, Jones Chemical had two unpermitted discharges. Additional water and contaminants enter the stream from stormsewer discharges and urban or industrial runoff both upstream and downstream of the study area.

Most of the stream in Riverview has been enclosed. All of the stream has been channelized for drainage improvement and some sections have been dredged more than once to remove accumulated materials. In the 1950's, raw sewage from Riverview was discharged into the creek and extensive fish kills occurred on occasion (Robert Parker - personal communication). Sewage discharges have since been removed.

The unpermitted discharge from Jones Chemical to Monguagon Creek was found during an aerial reconnaissance flight on December 17, 1979 by William Murphy,

Environmental Enforcement Division, Department of Natural Resources (DNR). Photographs of the area taken at that time clearly show a discharge plume into the creek (DNR Exhibit No. —).

Since the discovery of the unpermitted Jones Chemical and prior to this study, sampling of the discharge, waste streams in the facility and the creek were undertaken. Lawrence Epskamp, District 14 Conservation Officer, Law Division collected water samples upstream and downstream of the discharge and from the surface and bottom of the discharge on February 9, 1980. The pH of the discharge was 11.3 at its surface and 15.7 at the bottom. Both are extremely alkaline pH values and would not be permitted. Sodium (9100 mg/l), chlorides (7400 mg/l) and sulfates (320 mg/l) were very high (Appendix I) in this discharge.

William Stone, District I, Water Quality Division, accompanied by William Murphy, collected water and sediment samples within the Jones Chemical facility on February 14, 1980. An in-plant sump had extremely high levels of iron (280,000 mg/kg), lead (3400 mg/kg), and zinc (1500 mg/kg) in the semi-fluid sediments in the sump bottom (Appendix II). Chlorine ranged from high to very high in six of seven locations sampled within the facility. Chlorides and sodium followed a similar pattern to chlorine, with the water designated "pipe to sump", field ID number one (1) and having the lowest values and the sample designated "from NaOCl product tank", field ID number seven (7) having the highest value (Appendix III). Very high coliform bacteria counts were found in samples from an outside sump and indicated that untreated human wastes (Appendix IV) were in the Jones Chemical wastewaters prior to discharge.

White (1979) evaluated Pennwalt's discharge (006) as to its potential toxic effects on aquatic animals in Monguagon Creek and concluded that toxic conditions would exist as a result of the discharge. She found the NPDES permit limits for BOD₅, suspended solids and ammonia were exceeded and recommended that Pennwalt's NPDES permit limitations for ammonia and pH be revised.

RESULTS AND DISCUSSION

Water Quality

During the biological survey, water samples were collected and analysed for chlorine by staff of the nearby Wayne County Public Works laboratory. Sample #2 was collected in Pennwalt's discharge (station B) and had 4.3 mg/l total chlorine (Appendix V). Above Jones Chemical (#3, station C) only free chlorine at 0.1 mg/l was detected. The Jones Chemical discharge (#4) had 9900 mg/l total chlorine. The pH of the discharge at the time, as estimated by indicator paper, was approximately 12. No discharge plume was evident in the stream during this study, probably as a result of reduced flows. Downstream at station E (#5) free chlorine decreased to 0.4 mg/l and total chlorine to 1.4 mg/l (PPM equals mg/l) even under reduced discharge flows.

Recommended concentrations of total chlorine in discharges is 0.024 mg/l at the edge of the mixing zone and concentrations of chlorine are not to exceed 0.5 mg/l in the discharge in Michigan. Chlorine is a very toxic substance (Brungs, 1976), and should be greatly reduced in the Jones Chemical discharge as it was almost 20,000 times the discharge concentration limit. Chlorine concentrations should also be reduced in the Pennwalt discharge to acceptable levels.

An oil sheen was observed in the Pennwalt discharge channel and at all downstream stations during this study (Appendices X-XIII). This is in violation of the NPDES discharge permit which stipulates "no visible film" in Monguagon Creek.

A single water sample collected February 20, 1980 from a 15 cm (6 inch) diameter steel pipe (#1 discharge) apparently discharging stormwater runoff and/or snow melt at the time, had 490 mg/l suspended solids (lab sheet not included) and resulted in sediment deposition in the stream (Figure 3). Some control measures should be sought for this discharge.

Another water sample was taken from the other Jones Chemical discharge (#2) in which the extremely high levels of chlorine were found and analyzed for fecal coliform bacteria. Counts of fecal bacteria were less than 100 per 100 ml as would be expected with high levels of chlorine (Appendix IV). Toilet paper was seen in the effluent at the time of sampling (Appendices XI and XII). Whenever chlorine was not being discharged, raw sewage could have been discharged. In either case, treatment of human wastes would have been inadequate.

Sediment Contaminants

Substances such as heavy metals, oils and synthetic organic compounds which are relatively insoluble in water will usually be found in stream or lake sediments at concentrations many times higher than can be found in the water. Contaminants of this type will also remain bound in sediments for extended time periods and thus reflect past discharges of contaminants. Many of these sediment contaminants are toxic to aquatic life when concentrations are elevated. Presently, the degree of sediment contamination or its pollutional status is based on the 1977 EPA dredge spoils criteria.

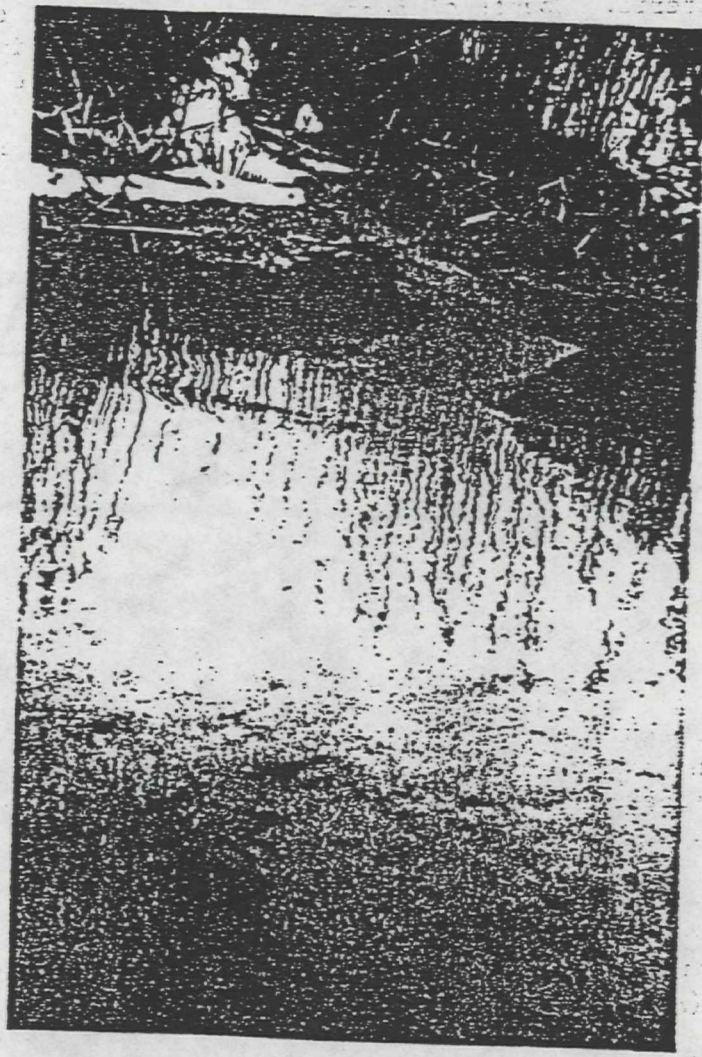
Using EPA's criteria as a basis for comparison, all stations had "heavily polluted" sediments for a number of parameters. At station A, oil (5500 mg/kg), arsenic (12 mg/kg), zinc (440 mg/kg), lead (90 mg/kg), iron (25,000 mg/kg), copper (50 mg/kg) and PCB (10 mg/kg) (Appendix VI) were the contaminants above the non-polluted level of the EPA (1977) dredge spoils criteria (Appendix VII). These sediment contaminants have probably reached Monguagon Creek via urban runoff or discharges upstream in the City of Riverview or from landfills and nearby industrialized areas.

In Pennwalt's discharge channel (station B) and downstream at station C every parameter, except iron, at least doubled in concentration in sediments. In addition, cyanide (5-6 mg/kg), cadmium (6-10 mg/kg), nickel (90-120 mg/kg), and mercury (2 mg/kg) were found at "heavily polluted" areas.

Immediately downstream of the Jones Chemical discharges most sediment contaminant concentrations (station D) were similar to those found upstream at Station A or C. However, higher concentrations of copper, iron, nickel, lead, zinc and manganese existed in the sample collected nearest Jones Chemical. Zinc values were 4700 mg/kg in this sample and 2500 mg/kg in the sample across the stream. As indicated before by Stone's data, the Jones Chemical discharge probably contained high levels of lead, zinc and iron. Zinc was apparently being precipitated quickly once it reached the stream and other metals at lower rates.

Downstream at station E the concentration of lead (920 mg/kg), nickel (230 mg/kg), copper (250 mg/kg), chromium (390 mg/kg), cadmium (10 mg/kg) and cyanide (12 mg/kg) about doubled again. Zinc was found at 18,000 mg/kg, an extremely high sediment

FIGURE 3. Discharge (#1) from Jones Chemical bearing suspended and settleable solids, with associated deposition in Monguagon Creek, February 20, 1980. Photograph by Frank Horvath.



concentration. These very high levels of contaminants probably existed at this location mainly as a result of discharges from Pennwalt and Jones Chemical. The marked increase in certain of the above parameters in downstream sediments at station E was probably the result of additional loadings of heavy metals from Jones Chemical and the chemical reaction and precipitation of these substances after the highly chlorinated Jones Chemical discharge were mixed with the receiving waters.

Macroinvertebrates

Animal communities living in or on the bottom of lakes and streams are the best indicators of aquatic environmental conditions. These animal communities are ubiquitous in undisturbed streams. Benthic or bottom dwelling animal species which together constitute a benthic community live most or all of their lives in the water. Aquatic insects, with rare exception, leave the water for short periods to mate and lay eggs but their immature larval stages may exist for more than a year in an aquatic environment. Aquatic worms (oligochaetes) spend all their lives in the aquatic environment. During this extended period of aquatic development they react to a myriad of physical and chemical parameters and thus are indicators of past environmental conditions.

A stream comparable in size to Monguagon Creek, under relatively unmodified stream conditions, would have benthic communities made up of many species of animals without a dominant species or species group. Biomass (weight per unit area) would usually be at intermediate levels ($10-50 \text{ gm/m}^2$ wet weight) and distributed among a number of species. Macroinvertebrate density (number per unit area) would usually range from $1-5000/\text{m}^2$. Discharges of pollutants in sufficient quantities results in marked and easily detected changes in benthic community structure. Sensitive species or species groups are eliminated and the benthic community becomes dominated by more pollution tolerant forms. Under moderately polluted conditions some forms may thus reach extreme densities and biomass. If pollution is increased further, all the above benthos parameters decrease. In the most extreme situations benthic communities are absent.

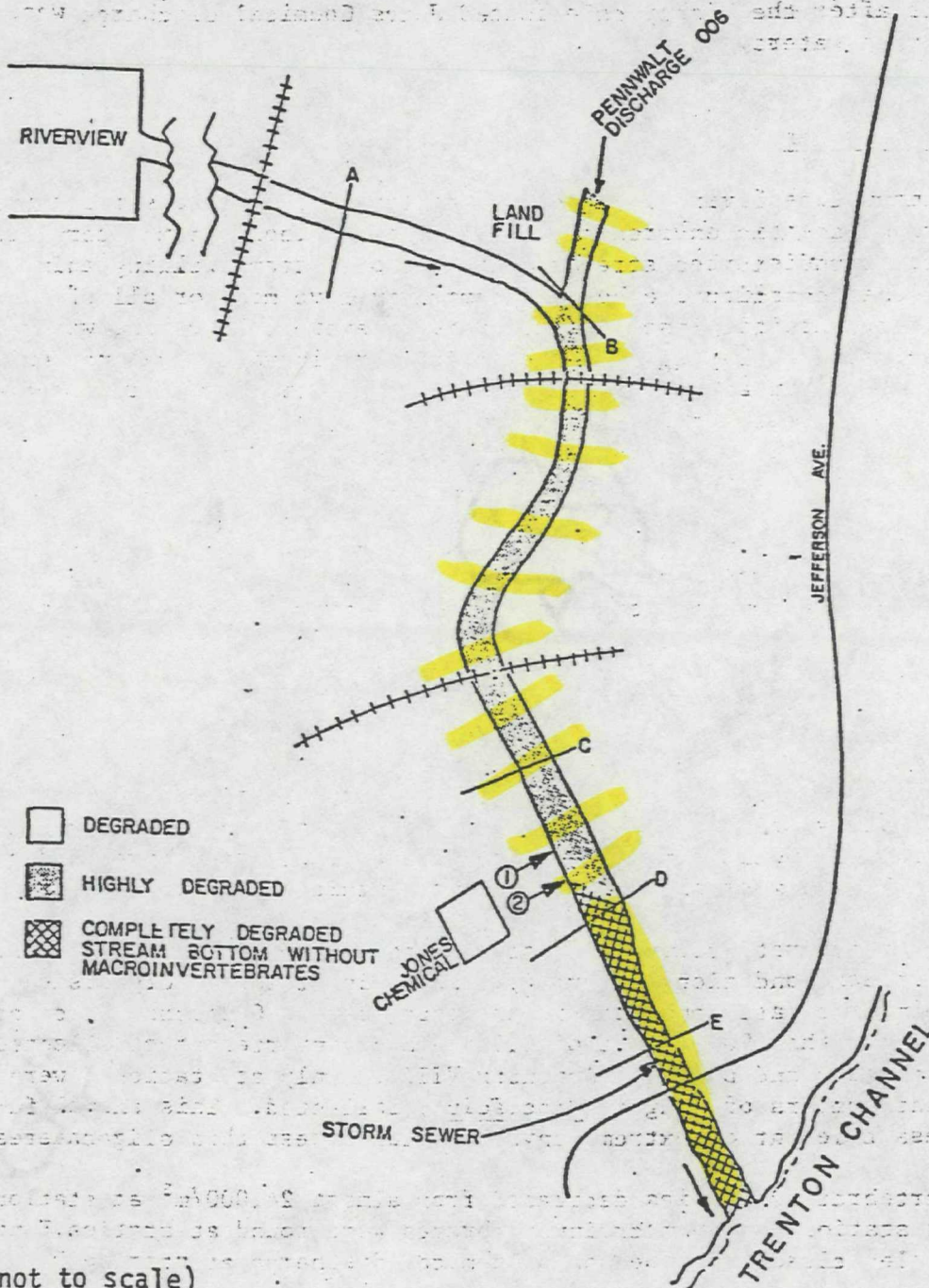
The macroinvertebrate communities of Monguagon Creek indicated a degraded to highly degraded stream condition (Figure 4). Pollution tolerant organisms dominated the macroinvertebrate community in the study area. Oligochaetes or aquatic worms comprised more than 90 percent of all the macroinvertebrates collected both in terms of density and biomass (Appendix VIII). Only at station A were significant numbers of midges (Procladius) collected. This animal feeds on worms but is less tolerant of extreme environmental stress than oligochaetes.

Macroinvertebrate densities decreased from almost $24,000/\text{m}^2$ at station A to $318/\text{m}^2$ at station D. No macroinvertebrates were found at station E nor in the three samples closest to the Jones Chemical discharge at station D.

Fish

Only two fish (gizzard shad) were observed in this shallow, open stream. Even this was surprising under the conditions. One dead gizzard shad was found just below the Jones Chemical discharge. Apparently the fish had died recently as deterioration was not evident. The second fish was disoriented and swimming in circles as it moved downstream in the vicinity of station E. Total chlorine

Figure 4. Areas of degradation in Monguagon Creek, Wayne County, Michigan February 20, 1980 based on benthic macroinvertebrate community structure.



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death in less than half an hour (Mattice and Zittel, 1976).

SUMMARY AND CONCLUSIONS

Benthic animals communities, or their absence in Monguagon Creek indicated stream conditions that ranged from degraded to completely degraded. Degradation or damage to the benthic communities was associated with high concentrations of sediment contaminants such as oils, toxic heavy metals, cyanide and high concentrations of chlorine in the water. Similar responses of benthic communities to such contaminants have been observed many times before (Mackenthun, 1969). Recently, Wentzel and McIntosh (1977) also found oligochaete dominated benthic communities where heavy metals in lake sediments were extremely high (cadmium-996 mg/kg, zinc-14,033 mg/kg, and chromium-2106 mg/kg) and midge larvae were present only where heavy metals decreased in the sediment. Given the concentrations of sediment contaminants in Monguagon Creek, it is improbable that the elimination of the benthic community downstream of the Jones Chemical discharge was due only to their discharge of heavy metals. The pattern of benthos elimination closely approximated the area of stream bottom impacted by the plume from the Jones Chemical unpermitted discharge with very high concentrations of extremely toxic chlorine. It is therefore very reasonable to conclude that a minimum of 0.15 km of Monguagon Creek has been damaged as a result of the unpermitted Jones Chemical discharge.

Damage to Monguagon Creek undoubtedly also extends for the remaining 0.7 km to its confluence with the Trenton Channel. Sediment contaminants would surely remain at or above concentrations similar to those found downstream of the Pennwalt discharge, as most of these substances do not biodegrade readily and channel erosion processes tend to transport sediments downstream. It is not certain however, that the macroinvertebrate community has been eliminated in this lower stream reach nor could any or all damage be blamed with certainty on the upstream discharges. Storm sewers and runoff from streets, coal piles and the surrounding area would have degrading effects in the lower stream reach. Furthermore, it is not certain whether chlorine concentrations have been at toxic concentrations to the Trenton Channel in the past because chlorine readily reacts and loses its toxicity.

In order to expedite the recovery of Monguagon Creek several actions should be undertaken. A study of Monguagon Creek upstream of the study site and in Riverview should be undertaken to determine the source(s) of stream contaminants. Pennwalt's wastewater treatment should be upgraded to meet NPDES requirements and the Jones Chemical discharges should either be eliminated or adequate treatment be provided to protect Monguagon Creek. In addition, the highly contaminated sediments downstream of Pennwalt and Jones Chemical should be removed, not only to facilitate stream recovery but to prevent their discharge to the Trenton Channel.

Field Work By: William Murphy, Enforcement Investigator,
Environmental Enforcement Division
Frank Horvath, Aquatic Biologist,
Water Quality Division
Elwin Evans, Aquatic Biologist,
Water Quality Division

Report By: Elwin Evans, PhD
Aquatic Biologist
Biology Section
Water Quality Division
Department of Natural Resources

References Cited

- Brungs, William. 1976. Effects of Wastewater and Cooling Water Chlorination on Aquatic Life. U.S. EPA, Office of Research and Development. EPA-600/3-76-098.
- Mackenthun, K. 1969. The Practice of Water Pollution Biology. U.S. Department of the Interior. 281 p.
- Mattice, J. S. and H. E. Zittel. 1976. Site-specific Evaluation of Power Plant Chlorination. Journ. Water Poll. Cont. Fed. 48(10) 2284-2308.
- Wentsel, R. and A. McIntosh. 1977. Sediment Contamination and Benthic Macroinvertebrate Distribution in a Metal Impacted Lake. Environ. Pollut. 14:187-193.
- White, Bonnie. 1979. Report on an On-Site Toxicity Evaluation Conducted at Pennwalt Corporation, All outfalls No. 820298, Wayne County, Wyandotte, Michigan. July 9-13, 1979. Michigan Department of Natural Resources. 21 p.

PEAS 205-80

MICHIGAN DEPT. OF NATURAL RESOURCES, ENVIRONMENTAL LABORATORY ANALYSIS -- ENVIRONMENTAL QUALITY - WATER - GENERAL USAGE

4566 PROJ 50 COST CENTER 50 PR COLLECTED BY *James E. Simpson* TRANSFERRED TO RECEIVED AT LAB EXAMINER *J. L. P. P.*
 LOCATION FILED *Jones Chemical - Riverview* SAMPLE REMARKS *High pH - chlorine present* SEND RESULTS TO (NAME & SECTION) *Bill Stone Dist #1*

DESCRIPTION OF SAMPLING SITE OR SAMPLE	REF. NO.	STORE NUMBER	START DATE YYMMDD	TIME MIL TTTT	DEP-TH FEET	LAB NO.	TEMP. DEGREE CENT.	OXYGEN DIS. MG/L	PH STAND. UNITS	COND. 25 C US/CM	BOD-5 TOTAL MG/L	C.O.D. LOW MG/L	T.O.C. ANFUL MG/L	NO3NO. TOTAL MG/L
	P					00008	00010	00300	00400	00095	00310	00335	00680	00330
<i>upstream-top (surface)</i>	I01		800201	1650		5035			7.7 SC					
<i>downstream-top (surface)</i>	I02		800109	1650		5036			7.6 SC					
<i>discharge-bottom</i>	I03		800209	1650		5037			15.7 SC					
<i>discharge-top (surface)</i>	I04		800209	1650		5038			11.3 SC					
	I05													
	I06													
	I07													
	I08													
	I09													
	I10													

NO3 TOTAL MG/L N	NO2 TOTAL MG/L N	NH3 TOTAL MG/L N	KJEL N TOTAL MG/L N	ORTH. P TOTAL MG/L P	PHOS. TOTAL MG/L P	CA TOTAL MG/L	MG TOTAL MG/L	NA TOTAL MG/L	K TOTAL MG/L	F TOTAL MG/L	CL TOTAL MG/L	SI REACT. MG/L	S TOTAL MG/L S	SO4 TOTAL MG/L	ALK. TOTAL MG/L
00620	00615	00610	00625	70507	00665	00916	00927	00929	00937	00951	00940	00958	00745	00945	00410
								2450			4150			3450	
								2530			4350			3550	
								910050			710050			22050	
								15050			16650			4350	

* these samples are in improper containers because this was an emergency sampling done by a Conservation Officer

APPENDIX II

MICHIGAN DEPT. OF NATURAL RESOURCES, ENVIRONMENTAL LABORATORY ANALYSIS -- INORGANICS - SEDIMENTS - DRY WT. BASIS

LAB LOG 4512 PROJ COST PR 3 COLLECTED WE. 8/14/80 TRANSFERRED TO Bill Murphy RECEIVED AT LAB EXAMINER Bill Murphy

LOCATION SAMPLED Jones Chemical - Riverview SAMPLE REMARKS Kept chilled / Decant H₂O SEND RESULTS TO Bill Murphy EED (NAME & SECTION)

FIELD ID.	DESCRIPTION OF SAMPLING SITE OR SAMPLE	REF NO.	STORE NUMBER	START DATE YYMMDD	TIME MIL TTTT	ST OR B	NUM SAM- PLES	END DATE YYMMDD	TIME MIL TTTT	DEP- TH FEET	LAB NO.	TOTAL SOLIDS PERCENT	VOLITL SOLIDS A.T.S.	CH-SED DRY-WT HG/KG	CD-SED DRY-WT HG/KG	CH-10 DRY-WT HG/KG
4	inplant sump	C01		800214	13:30						5157	71	70322	06721	01620	15
		C02														
		C03														
		C04														
		C05														
		C06														
		C07														
		C08														
		C09														
		C10														

REF NO.	CU-SED DRY-WT HG/KG	FE-SED DRY-WT HG/KG	NI-SED DRY-WT HG/KG	PO-SED DRY-WT HG/KG	ZN-SED DRY-WT HG/KG	NA-SED DRY-WT HG/KG	AS-SED DRY-WT HG/KG	HG-SED DRY-WT HG/KG	SE-SED DRY-WT HG/KG							
01	1	280.500		3400	1500			71921	01140							
02																
03																
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10																

ESD-01102 REV: 10/79

ecology and environment

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recycled paper

[illegible]

APPENDIX IV

MICHIGAN DEPT. OF NATURAL RESOURCES, ENVIRONMENTAL LABORATORY ANALYSIS -- PHYSICAL & BIOLOGICAL - WATER - GENERAL USAGE

LAB NO. 4504 PROJ CODE 75 COST CENTER --- PR SE COLLECTED BY U.E. Stone TRANSFERRED TO Wm. Murphy RECEIVED AT LAB --- EXAMINER RV
 LOCATION SAMPLED Jones Chemical Co. - Riverview SAMPLE REMARKS --- SEND RESULTS TO (NAME & SECTION) BILL MURPHY
Env. Eng. Div.

ILLU D.	"DO NOT PUNCH" DESCRIPTION OF SAMPLING SITE OR SAMPLE	REF NO. P	STORE NO. NUMBER	START DATE YYMMDD	TIME H:MM	DEPTH FEET	LAD NO.	FECAN COL MF	TOTAL COL MF	RES-NE SS-105 HG/L	RES-TE TDS-180 MG/L				
8	high Pipe into outside Sump	I01		900214	13:55		5160	300000	300000						
9	" " " " " "	I02		"	14:00		5167	230000	260000						
		I03													
		I04													
		I05													
		I06													
		I07													
		I08													
		I09													
		I10													

REF NO.															
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02															
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04															
05															
06															
07															
08															
09															
10															

APPENDIX V

Royce E. Smith
Managing Director
Duane R. Egeland
Deputy Managing Director,
Director of Engineering

Chester Wozniak
Assistant Managing Director,
Director of Administration

John E. Breen
Director of Legal Services

John W. Hubert
Director of Finance

Rex McCormick
Deputy Secretary

Wayne
County
Public
Works



900 West Lafayette
Detroit, Michigan
48225

313 224 3820

On February 20, 1980, 3:00 p.m. Bill Murphy of the Department of Natural Resources brought in four samples to be tested for residual chlorine. The samples were collected within one half of an hour of analysis.

I tested the samples as numbered below.

#2	0.5	P.P.M. free chlorine	4.3 P.P.M. total chlorine
#3	0.1	P.P.M. free chlorine	
#4	9500	P.P.M. free chlorine	9900 P.P.M. total chlorine
#5	0.4	P.P.M. free chlorine	1.4 P.P.M. total chlorine

All samples tested using D.P.D. method of chlorine analysis.

Thomas Snoens, Chemist
Wayne County Public Works

Thomas N. Snoens

TS/cia

APPENDIX VI

Sediment contaminants in Monguagon (Huntington) Creek, Riverview, Wayne County, Michigan, February 20, 1980. All values in milligrams per kilogram (mg/kg) dry weight unless otherwise indicated.

O & G

	Total Solids %	PCB 1260	Cn	Cd	Cr	Cu	Fe	Ni	Pb	Zn	Mn	As	Hg	Oil
<u>Station A</u>														
0.18 km upstream Pennwalt's Discharge mid channel	61	10.0**	<1	2	25*	50*	25,000**	17	90**	440**	380*	12**	<1	5,500**
<u>Station B</u>														
in Pennwalt's Discharge Channel, mid channel	57	26.0**	6**	5	160**	110**	32,000**	120**	420**	2,800**	490*	9**	<1	12,000**
<u>Station C</u>														
0.05 km upstream Jone's Chemical Discharge J.C. side across stream	55 32	20.0** 3.2	5** 5**	6** 10**	140** 230**	110** 130**	37,000** 29,000**	90** 110**	690** 560**	340** 2,800**	570** 360*	18** 33**	<1 2**	10,000** 20,000**
<u>Station D</u>														
0.02 km downstream Jone's Chemical Discharge J.C. side across stream	49 54	4.6 8.1	8** 4**	6** 5	160** 160**	130** 110**	33,000** 31,000**	130** 110*	640** 590**	4,700** 2,500**	530** 500**	15** 26**	<1 1**	11,000** 12,000**
<u>Station E</u>														
0.17 downstream Jone's Chemical Discharge mid channel	32	6.1	12**	10**	390**	250**	38,000**	230**	920**	18,000**	560**	20**	1**	12,000**

U.S. EPA 1977 Dredge Spoils Criteria

* moderately polluted

** heavily polluted

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APPENDIX VII

April 1977 U.S. EPA Dredged Spoil Disposal Criteria Classification Guidelines for Great Lakes Harbors. Values in mg/kg dry weight, values otherwise noted.

Parameter	Non Polluted	Moderately Polluted	Heavily Polluted
Volatile solids %	<5	5-8	>8
COD	<40,000	40-80,000	>80,000
BOD	<1,000	1,000-2,000	>2,000
Oil & Grease (Hexane Solubles)	<1,000	1,000-2,000	>2,000
Lead	<40	40-60	>60
Zinc	<90	90-200	>200
Cadmium	<75	75-200	>200
Cyanide	<0.10	0.10-0.25	>0.25
Phosphorus	<420	420-650	>650
Iron	<17,000	17,000-25,000	>25,000
Copper	<20	20-50	>50
Manganese	<300	300-500	>500
Arsenic	<3	3-8	>8
Chromium	*	*	>6
Barium	<25	25-75	>75
Strontium	<20	20-60	>60
Copper	<25	25-50	>50
Mercury			≥1
Total PCB's **			≥10

* Lower limits not established

** The pollutional status of sediments with total PCB concentrations between 1 and 10 mg/kg dry weight will be determined on a case-by-case basis.

Appendix VIII

Estimated numbers and wet weight of benthic macroinvertebrates per square meter from samples collected with a petite ponar (15 x 15 cm) in Monguagon (Huntington) Creek near Riverview, Wayne County, Michigan, February 20, 1980.

Station	A 0.18 km upstream Pennwalt Discharge			B in Pennwalt's Discharge Channel			C 0.05 km upstream Jones's Chemical Discharge				
Location	A-1	A-2	A-3	B-1	B-2	B-3	C-1	C-2	C-3	C-4	C-5
Sample Number											
Sampling Sediment	unconsolidated black			gravel	clay	clay	organic	organic	clay	clay	organic
Characteristics	organic; detritus			ooze	organic	organic	soft	gray	soft detritus	soft	clay
Macroinvertebrate Taxa											
Oligochaetes	3,268	54,825	7,740	17,501	1,331	5,418	5,848	8,428	2,623	1,290	258
wet weight	2.6	67.1	6.7	11.4	1.9	7.4	5.6	5.8	2.0	2.0	0.2
Nematodes		473					43				
wet weight		0.4					0.01				
Chironomids											
Procladius	1,032	3,354	817								
wet weight	0.9	1.0	0.6								
Estimated no./m ²	4,300	58,625	8,557				5,891				
Estimated wet wt./m ²	3.5	68.5	7.3				5.61				
Average no./m ²		23,836			8,084				3,689		
Average wet wt./m ²		26.4			6.9				3.1		
Average organism wet wt.		0.0011			0.0009				0.0008		

Station	D 0.02 km downstream Jones's Chemical Discharge					E 0.17 km downstream Hone's Chemical Discharge		
Location	D-1	D-2	D-3	D-4	D-5	E-1	E-2	E-3
Sample Number								
Sampling Sediment	sand	clay	black	gray	clay	organic	organic	clay
Characteristics	organic	sand	fine	black	black	black	black	gray
	black	organic	organic	organic	organic	detritus	detritus	floc
Macroinvertebrate Taxa								
Oligochaetes	0	0	0	129	1,462	0	0	0
wet weight	0	0	0	0.1	1.6	0	0	0
Estimated no./m ²	0	0	0			0	0	0
Estimated wet wt./m ²	0	0	0			0	0	0
Average no./m ²			318				0	
Average wet wt./m ²			0.3				0	
Average organism wet wt.			0.0009				0	

APPENDIX IX

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
WATER QUALITY DIVISION

BIOLOGY SECTION
STREAM PROBLEM ASSESSMENT

Station Number A Investigator(s) EVANS, HORVATH, MURPHY
Date 2/20/80 TIME 12:30 PHOTOGRAPH NUMBER 11, 12, 13
BODY OF WATER MONGUISON Rk LOCATION RIVERVIEW
COUNTY WAYNE TWP 5 THP RIVERVIEW
REASON FOR SURVEY JONES CHEMICAL - PENNWELT DISCHARGE IMPACTS
VICINITY LAND USE: Mostly Forest Mostly Urban Mostly Agriculture Other INDUSTRIAL
AVE. STREAM WIDTH 7 m AVE. STREAM DEPTH 0.5 m VELOCITY <0.1 ms STREAM km 1.78
STREAM SHADING: Open Partly Open Shaded STREAM TYPE: Coldwater warmwater
WATER TEMP. 5 °C AIR TEMP. 6 °C WEATHER: Sunny-Partly Cloudy-Cloudy-Rainy CAN u/s: Yes No km
CHANNELIZED: Yes No CHANNEL EROSION: None Slight Moderate Severe HIGH WATER MARK 0.16 m
SECCHI DISC TRANS: — TURBIDITY: Clear Slightly Turbid Turbid Opaque WATER COLOR —
WATER ODORS: Normal Sewage Petroleum Chemical Other
SURFACE OILS: None Slick Sheen Globbs Flecks
SEDIMENT ODORS: Normal Sewage Petroleum Chemical Anaerobic Other
SEDIMENT OILS: Absent Slight Moderate Profuse
DEPOSITS: Sludge Sandust Paperfiber Sand Relict Shells Other TWIGS + LEAVES
ARE THE UNDERSIDES OF STONES WHICH ARE NOT DEEPLY IMBEDDED IN SUBSTRATE BLACK? YES NO NA

SUBSTRATE TYPE	FLOW VELOCITY m/sec	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA	SUBSTRATE TYPE	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
BOULDERS*	>1.2 (>3 fps)	256 mm (10") dia.		CLAY	Slick texture	
RUBBLE*	>0.6 (>2 fps)	64-256 mm (2.1-10") dia.		MARL	Grey, shell fragments	
GRAVEL*	>0.3 (>1 fps)	2-64 mm (0.1-2.5") dia.		DETRITUS	Sticks, wood, coarse plant materials	5
SAND	>0.2 (>0.7 fps)	0.05-2.00 mm dia. Gritty texture	5	FIBROUS PEAT	Partially decomposed plant material	
SILT	>0.12 (>0.4 f.p.s.)	0.004-0.006 mm dia.		PULPY PEAT	Finely divided plant material, parts indistinguishable	
MUCK-MUD	>0.12 (>0.4 fps)	black, very fine organic	90	LOGS & STICKS		
*IMBEDDEDNESS: 0 = NONE 1 = 1/3 OR LESS 2 = 2/3 OR MORE						

BIOTA:

PHYTOPLANKTON	0	1	2	3	4	SLIMES	0	1	2	3	4
PERIPHYTON	0	1	2	3	4	ZOOPLANKTON	0	1	2	3	4
FILAMENTOUS ALGAE	0	1	2	3	4	MACROINVERTEBRATES	0	1	2	3	4
MACROPHYTES	0	1	2	3	4	FISH	0	1	2	3	4

0 - Absent 1 - Sparse 2 - Moderate 3 - Abundant 4 - Profuse

FISH

GAME FISH

ROUGH FISH

FORAGE FISH

AQUATIC PLANTS

PERIPHYTON

FILAMENTOUS ALGAE

MACROPHYTES

STREAMBANK
VEGETATION:

GRASSES

BRUSH

HERBACEOUS

CONIFERS

DECIDUOUS

BARREN

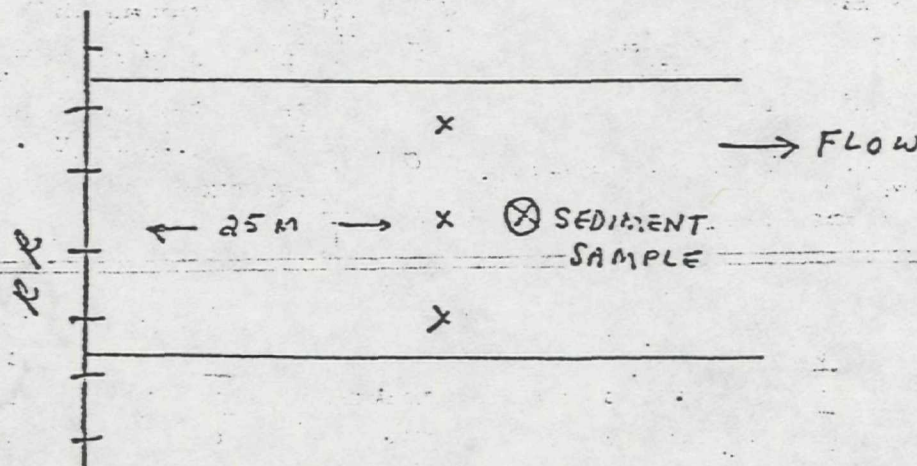
OTHER

MACROBENTHOS QUALITATIVE SAMPLE CHECK LIST (INDICATE DOMINANT GROUPS)

<u>SPONGES</u>	<u>DRAGONFLIES</u>	<u>RATTAILED MAGGOTS</u>
<u>HYDRA</u>	<u>DAMSEL FLIES</u>	<u>MIIDGES</u>
<u>FLATWORMS</u>	<u>TRUE BUGS</u>	<u>STONEFLIES</u>
<u>ROUNDWORMS</u>	<u>BEETLES</u>	<u>MAYFLIES</u>
<u>LEECHES</u>	<u>AQUATIC CATERPILLARS</u>	<u>-BURROWERS</u>
<u>WATER MITES</u>	<u>ALDERFLIES</u>	<u>-SWIMMERS</u>
<u>SOEBUGS</u>	<u>HELLGRAMITES</u>	<u>-CLINGERS, SPRAWLERS</u>
<u>SCUDS</u>	<u>CRANEFLIES</u>	<u>CADDISFLIES</u>
<u>CRAYFISH</u>	<u>NO-SEE-UMS</u>	<u>-FREE LIVING</u>
<u>SNAILS-LIMPETS</u>	<u>BLACKFLIES</u>	<u>-PURSE CASE MAKERS</u>
<u>CLAMS</u>	<u>DEERFLIES</u>	<u>-TUBE CASE MAKERS</u>
<u>AQUATIC EARTHWORMS</u>	<u>MOSQUITOES</u>	<u>-SADDLECASE MAKERS</u>
	<u>SNIPEFLIES</u>	<u>-NET SPINNERS OR RETREATMAKERS</u>

NOTES, ETC.

STATION A



APPENDIX X

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
WATER QUALITY DIVISION

BIOLOGY SECTION
STREAM PROBLEM ASSESSMENT

Station Number B Investigator(s) EVANS HENRY, MURPHY
Date 5/20/80 TIME 12:45 PHOTOGRAPH NUMBER 14, 15, 16, 17
BODY OF WATER HONQUAGON CREEK LOCATION RIVERVIEW
COUNTY WAYNE TWP RIVERVIEW
REASON FOR SURVEY JONES CHEMICAL - PENNVALT DISCHARGE IMPACTS

VICINITY LAND USE: Mostly Forest Mostly Urban Mostly Agriculture Other INDUSTRIAL
AVE. STREAM WIDTH 5 m AVE. STREAM DEPTH 0.3 m VELOCITY >0.12 m/s STREAM km 1.50
STREAM SHADING: Open Partly Open Shaded STREAM TYPE: Coldwater Warmwater
WATER TEMP. 11 °C AIR TEMP. 5 °C WEATHER: Sunny-Partly Cloudy-Cloudy-Rainy DAY u/s: Yes 5 km
CHANNELIZED: Yes No CHANNEL EROSION: None Slight Moderate Severe HIGH WATER MARK 0.16 m
SECCHI DISC TRANS: — m TURBIDITY: Clear Slightly Turbid Turbid Opaque WATER COLOR —
WATER ODORS: Normal Sewage Petroleum Chemical Other
SURFACE OILS: None Slick Sheen Globbs Flecks

SEDIMENT ODORS: Normal Sewage Petroleum Chemical Anaerobic Other
SEDIMENT OILS: Absent Slight Moderate Profuse
DEPOSITS: Sludge Sawdust Paperfiber Sand Relict Shells Other
ARE THE UNDERSIDES OF STONES WHICH ARE NOT DEEPLY IMBEDDED IN SUBSTRATE BLACK? YES NO NA

SUBSTRATE TYPE	FLOW VELOCITY m/sec	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA	SUBSTRATE TYPE	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
BOULDERS*	>1.2 (>3 fps)	256 mm (10") dia.		CLAY	Slick texture	
RUBBLE*	>0.6 (>2 fps)	64-256 mm (2.1-10") dia.		MARL	Grey, shell fragments	
GRAVEL*	>0.3 (>1 fps)	2-64 mm (0.1-2.5") dia.		DETRITUS	Sticks, wood, coarse plant materials	
SAND	>0.2 (>0.7 fps)	0.06-2.00 mm dia. Gritty texture	50	FIBROUS PEAT	Partially decomposed plant material	
SILT	>0.12 (>0.4 fps)	0.003-0.006 mm dia.		PULPY PEAT	Finely divided plant material, parts indistinguishable	
MUCK-MUD	>0.12 (>0.4 fps)	black, very fine organic	50	LOGS & STICKS		
*IMBEDDEDNESS: 0 = NONE 1 = 1/3 OR LESS 2 = 2/3 OR MORE						

BIOA:

PHYTOPLANKTON	0	1	2	3	4	SLIMES	0	1	2	3	4
PERIPHYTON	0	1	2	3	4	ZOOPLANKTON	0	1	2	3	4
FILAMENTOUS ALGAE	0	1	2	3	4	MACROINVERTEBRATES	0	1	2	3	4
MACROPHYTES	0	1	2	3	4	FISH	0	1	2	3	4

0 - Absent

1 - Sparse

2 - Moderate

3 - Abundant

4 - Profuse

FISH GAME FISH
 ROUGH FISH
 FORAGE FISH

AQUATIC PLANTS PERIPHYTON FILAMENTOUS ALGAE

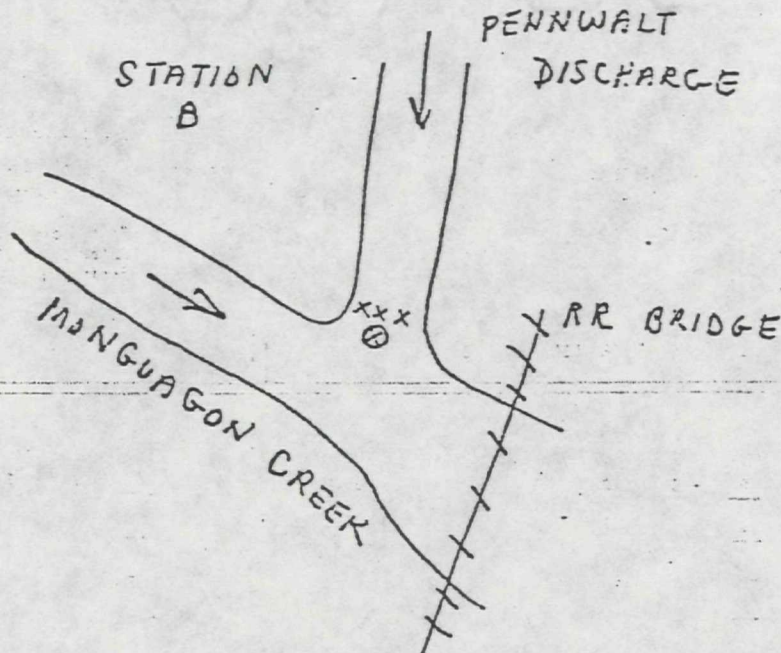
MACROPHYTES

STREAMSIDE VEGETATION: GRASSES BRUSH HERBACEOUS CONIFERS DECIDUOUS BARREN OTHER

MACROBENTHOS QUALITATIVE SAMPLE CHECK LIST (INDICATE DOMINANT GROUPS)

<u>SPONGES</u>	<u>DRAGONFLIES</u>	<u>PATTAILED MAGGOTS</u>
<u>HYDRA</u>	<u>DAMSELFLIES</u>	<u>MIDGES</u>
<u>FLATWORMS</u>	<u>TRUE BUGS</u>	<u>STONEFLIES</u>
<u>ROUNDWORMS</u>	<u>BEETLES</u>	<u>WATER BEETLES</u>
<u>LEECHES</u>	<u>AQUATIC CATERPILLARS</u>	<u>-BURROWERS</u>
<u>WATER MITES</u>	<u>ALDERFLIES</u>	<u>-SWIMMERS</u>
<u>SNAILBUGS</u>	<u>HELLGRAMITES</u>	<u>-CLIMBERS, SPRAWLERS</u>
<u>SCUDS</u>	<u>CRANEFLIES</u>	<u>CADDISFLIES</u>
<u>CRAYFISH</u>	<u>NO-SEE-UMS</u>	<u>-FREE LIVING</u>
<u>SNAILS-LIMPETS</u>	<u>BLACKFLIES</u>	<u>-PUSE CASE MAKERS</u>
<u>CLAMS</u>	<u>DOERFLIES</u>	<u>-TUBE CASE MAKERS</u>
<u>AQUATIC EARTHWORMS</u>	<u>MOSQUITOES</u>	<u>-SADDLECASE MAKERS</u>
	<u>SNIFEFLIES</u>	<u>-NET SPINNERS OR RETREATMAKERS</u>

NOTES, ETC.



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APPENDIX XI

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
WATER QUALITY DIVISION

BIOLOGY SECTION
STREAM QUALITY ASSESSMENT

Station Number C Investigator(s) EVANS, HOPKINS
Date 2/20/80 TIME 13:15 PHOTOGRAPH NUMBER 18, 19, 20
BODY OF WATER MONGUHAN CREEK LOCATION RIVERVIEW
COUNTY WAYNE TWP RIVERVIEW
REASON FOR SURVEY TONES CHEMICAL - PENNVALT DISCHARGE IMPACTS

VICINITY LAND USE: Mostly Forest Mostly Urban Mostly Agriculture Other INDUSTRIAL
AVE. STREAM WIDTH 20 ft AVE. STREAM DEPTH 0.3 ft VELOCITY 0.12 ms STREAM km 0.75
STREAM SHADING: Open Partly Open Shaded STREAM TYPE: Coldwater Warmwater
WATER TEMP. 7.7 °C AIR TEMP. 5 °C WEATHER: Sunny-Partly Cloudy-Cloudy Rainy DAM u/s: Yes No
CHANNELIZED: Yes No CHANNEL EROSION: None Slight Moderate Severe HIGH WATER MARK 0.15 m
SELCHI DISC TRANS: — TURBIDITY: Clear Slightly Turbid Turbid Opaque WATER COLOR —
WATER ODORS: Normal Sewage Petroleum Chemical Other
SURFACE OILS: None Slick Sheen Globbs Flecks

SEDIMENT ODORS: Normal Sewage Petroleum Chemical Anaerobic Other
SEDIMENT OILS: Absent Slight Moderate Profuse
DEPOSITS: Sludge Sawdust Paperfiber Sand Relict Shells Other
ARE THE UNDERSIDES OF STONES WHICH ARE NOT DEEPLY IMBEDDED IN SUBSTRATE BLACK? YES NO NA

SUBSTRATE TYPE	FLOW VELOCITY m/sec	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA	SUBSTRATE TYPE	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
BOULDERS*	>1.2 (>3 fps)	256 mm (10") dia.		CLAY	Slick texture	
RUBBLE*	>0.6 (>2 fps)	64-256 mm (2.1-10") dia.		MARL	Grey, shell fragments	
GRAVEL*	>0.3 (>1 fps)	2-64 mm (0.1-2.5") dia.		DETRITUS	Sticks, wood, coarse plant materials	<u>5</u>
SAND	>0.2 (>0.7 fps)	0.06-2.00 mm dia. Gritty texture		FIBROUS PEAT	Partially decomposed plant material	
SILT	>0.12 (>0.4 fps)	0.004-0.006 mm dia.		PULPY PEAT	Finely divided plant material, parts indistinguishable	
MUCK-MUD	>0.12 (>0.4 fps)	black, very fine organic	<u>95</u>	LOGS & STICKS		

*IMBEDDEDNESS: 0 = NONE 1 = 1/3 OR LESS 2 = 2/3 OR MORE

BIOTA:											
PHYTOPLANKTON	<u>0</u>	1	2	3	4	SLIMES	<u>0</u>	1	2	3	4
PERIPHYTON	<u>0</u>	1	2	3	4	ZOOPLANKTON	<u>0</u>	1	2	3	4
FILAMENTOUS ALGAE	<u>0</u>	1	2	3	4	MACROINVERTEBRATES	<u>0</u>	1	2	3	4
MACROPHYTES	<u>0</u>	1	2	3	4	FISH	<u>0</u>	1	2	3	4

0 - Absent 1 - Sparse 2 - Moderate 3 - Abundant 4 - Profuse

FISH

GAME FISH

ROUGH FISH

FORAGE FISH

AQUATIC PLANTS

PERIPHYTON

FILAMENTOUS ALGAE

MACROPHYTES

STREAMBANK
VEGETATION:

GRASSES

BRUSH

HERBACEOUS

CONIFERS

DECIDUOUS

BARREN

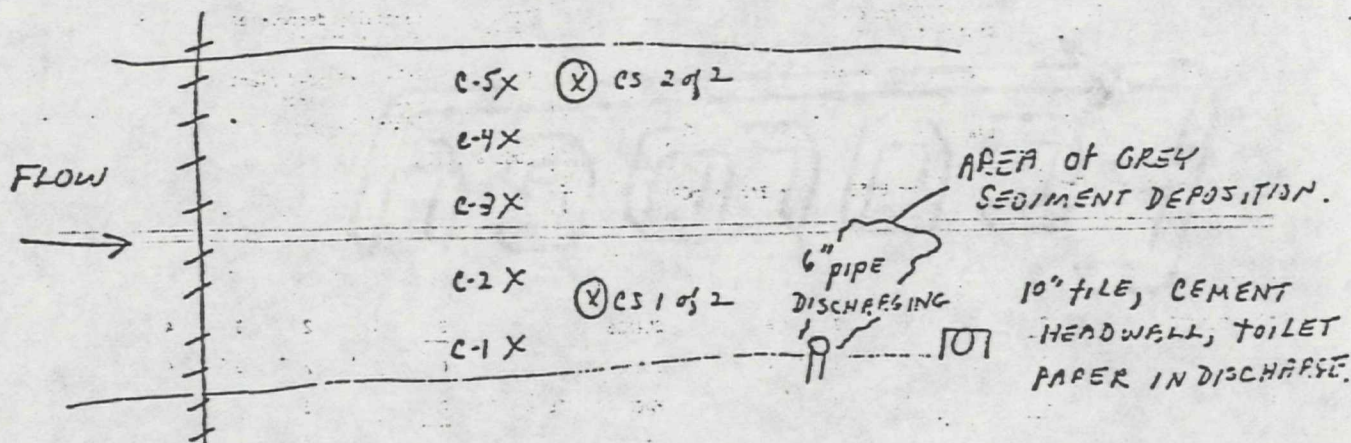
OTHER

MACROBENTHOS QUALITATIVE SAMPLE CHECK LIST (INDICATE DOMINANT GROUPS)

<u>SPONGES</u>	<u>DRAGONFLIES</u>	<u>RATTAILED MAGGOTS</u>
<u>HYDRA</u>	<u>DAMSELFLIES</u>	<u>MIDGES</u>
<u>FLATWORMS</u>	<u>TRUE BUGS</u>	<u>STONEFLIES</u>
<u>ROUNDWORMS</u>	<u>BEETLES</u>	<u>MAYFLIES</u>
<u>LEECHES</u>	<u>AQUATIC CATERPILLARS</u>	<u>-BURROWERS</u>
<u>WATER MITES</u>	<u>ALDERFLIES</u>	<u>-SWIMMERS</u>
<u>SOWBUGS</u>	<u>WELLGRANITES</u>	<u>-CLINGERS, SPINNERS</u>
<u>SCUDS</u>	<u>CRANEFLIES</u>	<u>CADDISFLIES</u>
<u>CRAYFISH</u>	<u>NO-SEE-UMS</u>	<u>-FREE LIVING</u>
<u>SNAILS-LIMPETS</u>	<u>SLACKFLIES</u>	<u>-PURSE CASE MAKERS</u>
<u>CLAMS</u>	<u>DEERFLIES</u>	<u>-TUBE CASE MAKERS</u>
<u>AQUATIC EARTHWORMS</u>	<u>MOSQUITOES</u>	<u>-SACDLECASE MAKERS</u>
	<u>SNIPFLIES</u>	<u>-NET SPINNERS OR RETREATMAKERS</u>

NOTES, ETC. *LAST SHOTS ON FILM RUINED.*

STATION C



*JONES
CHEMICAL*

APPENDIX XII

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
WATER QUALITY DIVISIONBIOLOGY SECTION
STREAM PROBLEM ASSESSMENT

Station Number D Investigator(s) EVANS, HURVATH
 Date 2/20/80 TIME 13:45 PHOTOGRAPH NUMBER —
 BODY OF WATER MONGEON CREEK LOCATION RIVERVIEW
 COUNTY WAYNE TWP RUESS TO RIVERVIEW
 REASON FOR SURVEY JONES CHEMICAL - PENN WALT DISCHARGE IMPACT

VICINITY LAND USE: Mostly Forest Mostly Urban Mostly Agriculture Other INDUSTRIAL
 AVE. STREAM WIDTH 20 m AVE. STREAM DEPTH 0.3 m VELOCITY 0.12 m/s STREAM km 0.68
 STREAM SHADING: Open Partly Open Shaded STREAM TYPE: Coldwater Warmwater
 WATER TEMP. 7.7 °C AIR TEMP. 5 °C WEATHER: Sunny-Partly Cloudy-Cloudy-Rainy DAM u/s: Yes No km
 CHANNELIZED: Yes No CHANNEL EROSION: None Slight Moderate Severe HIGH WATER MARK 0.15 m
 SECCHI DISC TRANS: — m TURBIDITY: Clear Slightly Turbid Turbid Opaque WATER COLOR —
 WATER ODORS: Normal Sewage Petroleum Chemical Other —
 SURFACE OILS: None Slick Sheen Globbs Flecks

SEDIMENT ODORS: Normal Sewage Petroleum Chemical Anaerobic Other —
 SEDIMENT OILS: Absent Slight Moderate Profuse
 DEPOSITS: Sludge Sawdust Paperfiber Sand Relict Shells Other —
 ARE THE UNDERSIDES OF STONES WHICH ARE NOT COMPLETELY IMBEDDED IN SUBSTRATE BLACK? YES NO NA

SUBSTRATE TYPE	FLOW VELOCITY m/sec	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA	SUBSTRATE TYPE	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
BOULDERS*	>1.2 (>3 fps)	256 mm (10") dia.		CLAY	Slick texture	
RUBBLE*	>0.6 (>2 fps)	64-256 mm (2.1-10") dia.		MARL	Grey, shell fragments	
GRAVEL*	>0.3 (>1 fps)	2-64 mm (0.1-2.5") dia.		DETRITUS	Sticks, wood, coarse plant materials	5
SAND	>0.2 (>0.7 fps)	0.06-2.00 mm dia. Gritty texture		FIBROUS PEAT	Partially decomposed plant material	
SILT	>0.12 (>0.4 fp.)	0.004-0.006 mm dia.		PULPY PEAT	Finely divided plant material, parts indistinguishable	
MUCK-MUD	>0.12 (>0.4 fps)	black, very fine organic	95	LOGS & STICKS		
* IMBEDDEDNESS: 0 = NONE 1 = 1/3 OR LESS 2 = 2/3 OR MORE						

BIOTA:

PHYTOPLANKTON	0	1	2	3	4	SLIMES	0	1	2	3	4
PERIPHYTON	0	1	2	3	4	ZOOPLANKTON	0	1	2	3	4
FILAMENTOUS ALGAE	0	1	2	3	4	MACROINVERTEBRATES	0	1	2	3	4
MACROPHYTES	0	1	2	3	4	FISH	0	1	2	3	4

0 - Absent

1 - Sparse

2 - Moderate

3 - Abundant

4 - Profuse

FISH

GAME FISH

ROUGH FISH

FORAGE FISH

SPAD
ONE GIZZARD, 12-15"; UNDER STRESS, SWIMMING
IN CIRCLES NEAR THE SURFACE.

AQUATIC PLANTS

PERIPHYTON

FILAMENTOUS ALGAE

MACROPHYTES

STREAMBANK
VEGETATION:

GRASSES

BRUSH

HERBACEOUS

CONIFERS

DECIDUOUS

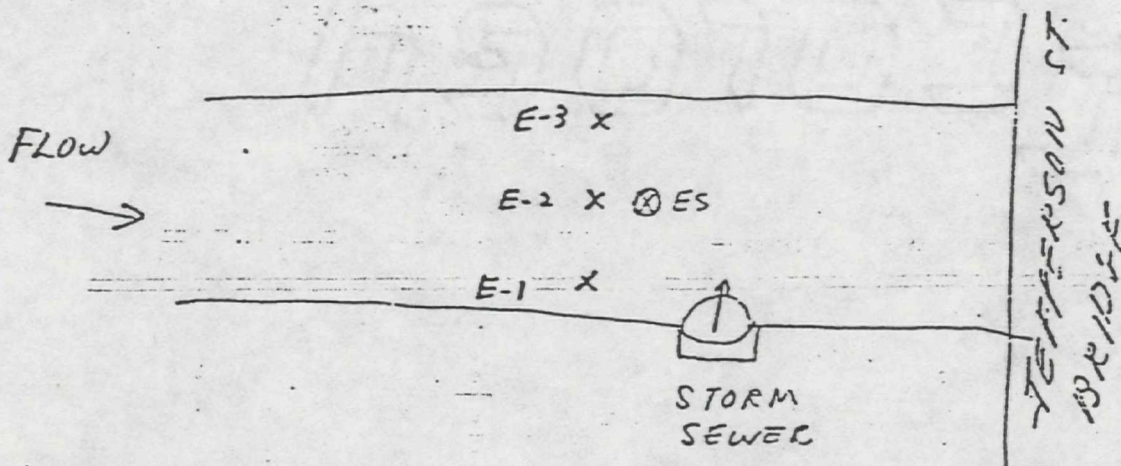
BARREN

OTHER

MACROBENTHOS QUALITATIVE SAMPLE CHECK LIST (INDICATE DOMINANT GROUPS)

SPONGES	DRAGONFLIES	RATTLED MAGGOTS
HYDRA	DAMSELFLIES	MIDGES
FLATWORMS	TRUE BUGS	STONEFLIES
ROUNDWORMS	BEETLES	MAYFLIES
LEECHES	AQUATIC CATERPILLARS	-BURROWERS
WATER MITES	ALDERFLIES	-SWIMMERS
SOWBUGS	HELLGRAMITES	-CLIMBERS, SPRAWLERS
SCUDS	CRANEFLIES	CADDISFLIES
CRAYFISH	HO-SEE-JUMS	-FREE LIVING
SNAILS-LIMPETS	BLACKFLIES	-PURSE CASE MAKERS
CLAMS	DEERFLIES	-TUBE CASE MAKERS
AQUATIC EARTHWORMS	MOSQUITOES	-SADDLECASE MAKERS
	SNIFEFLIES	-NET SPINNERS OR RETREATMAKERS

NOTES, ETC.



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APPENDIX XIII

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
WATER QUALITY DIVISIONBIOLOGY SECTION
STREAM PROBLEM ASSESSMENT

Station Number E Investigator(s) EVANS, MORTATH
 Date 2/22/82 TIME 14:15 PHOTOGRAPH NUMBER _____
 BODY OF WATER MONTGOMERY CREEK LOCATION RIVERVIEW
 COUNTY WAYNE TWP 5 RIVERVIEW
 REASON FOR SURVEY JONES CHEMICAL - PENALTY DISCHARGE IMPACTS
 VICINITY LAND USE: Mostly Forest Mostly Urban Mostly Agriculture Other INDUSTRIAL
 AVE. STREAM WIDTH 12 = AVE. STREAM DEPTH 0.4 m VELOCITY 0.12 m/s STREAM km 0.53
 STREAM SHADING: Open Partly Open Shaded STREAM TYPE: Coldwater Warmwater
 WATER TEMP. 7.7 °C AIR TEMP. 5.6 °C WEATHER: Sunny-Partly Cloudy-Cloudy-Rainy DAM u/s: Yes No km
 CHANNELIZED: Yes No CHANNEL EROSION: None Slight Moderate Severe HIGH WATER MARK 0.15 m
 SECCHI DISC TRANS: _____ m TURBIDITY: Clear Slightly Turbid Turbid Opaque WATER COLOR _____
 WATER ODORS: Normal Sewage Petroleum Chemical Other
 SURFACE OILS: None Slick Sheen Globs Flecks
 SEDIMENT COLORS: Normal Sewage Petroleum Chemical Anaerobic Other
 SEDIMENT OILS: Absent Slight Moderate Profuse
 DEPOSITS: Sludge Sawdust Paperfiber Sand Relics: Shells - Other
 ARE THE UNDERSIDES OF STONES WHICH ARE NOT DEEPLY IMBEDDED IN SUBSTRATE BLACK? YES NO NA

SUBSTRATE TYPE	FLOW VELOCITY m/sec	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA	SUBSTRATE TYPE	CHARACTERISTICS OR SIZE	PERCENT IN SAMPLING AREA
BOULDERS*	>1.2 (>3 fps)	256 mm (10") dia.		CLAY	Slack texture	
RUBBLE*	>0.6 (>2 fps)	64-256 mm (2.1-10") dia.		MARL	Grey, shell fragments	
GRAVEL*	>0.3 (>1 fps)	2-64 mm (0.1-2.5") dia.		DETRITUS	Sticks, wood, coarse plant materials	5
SAND	>0.2 (>0.7 fps)	0.05-2.00 mm dia. Gritty texture		FIBROUS PEAT	Partially decomposed plant material	
SILT	>0.12 (>0.4 fps)	0.004-0.006 mm dia.	5	PULPY PEAT	Finely divided plant material, parts indistinguishable	
MUCK-MUD	>0.12 (>0.4 fps)	black, very fine organic	90	LOGS & STICKS		
*IMBEDDEDNESS: 0 = NONE 1 = 1/3 OR LESS 2 = 2/3 OR MORE						

BIOTA:

PHYTOPLANKTON	0	1	2	3	4	SLIMES	0	1	2	3	4
PERIPHYTON	0	1	2	3	4	ZOOPLANKTON	0	1	2	3	4
FILAMENTOUS ALGAE	0	1	2	3	4	MACROINVERTEBRATES	0	1	2	3	4
MACROPHYTES	0	1	2	3	4	FISH	0	1	2	3	4

0 - Absent

1 - Scarce

2 - Moderate

3 - Abundant

4 - Profuse

FISH
SAME FISH
ROUGH FISH
FORAGE FISH

ONE DEAD SIZZARD SHAD BELOW
OUTFALL, NOT EATING.

AQUATIC PLANTS

PERIPHYTON

FILAMENTOUS ALGAE

MACROPHYTES

STREAMBANK
VEGETATION:

GRASSES

BRUSH

HERBACEOUS

CONIFERS

DECIDUOUS

BARREN

OTHER

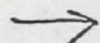
MACROBENTHOS QUALITATIVE SAMPLE CHECK LIST (INDICATE DOMINANT GROUPS)

SPONGES	DRAGONFLIES	RATT TAILED MAGGOTS
HYDRA	DAMSELFLIES	MIODES
FLATWORMS	TRUE BUGS	STONEFLIES
ROUNDWORMS	BEETLES	WATERFLIES
LEECHES	AQUATIC CATERPILLARS	-BURROWERS
WATER MITES	ALDERFLIES	-SWIMMERS
SCUDS	HELLGRAMITES	-CLIMBERS, SPRAWLERS
SCUDS	CRANEFLIES	CADDISFLIES
CRAYFISH	NO-SEE-UMS	-FREE LIVING
SNAILS-LIMNETS	BLACKFLIES	-PURSE CASE MAKERS
CLAMS	DEERFLIES	-TUBE CASE MAKERS
AQUATIC EARTHWORMS	MOSQUITOES	-SADDLECASE MAKERS
	SHREVEFLIES	-NET SPINNERS OR RETREATMAKERS

NOTES, ETC.

STATION D

FLOW



AREA of
LIGHT SEDIMENT
6" PIPE DISCHARGING



10" TILE

D-5 X @ DS 2 of 2

D-4 X

D-3 X

D-2 X

D-1 X

@ DS 1 of 2

DISCHARGING WITH

TOILET PAPER; pH 8-12, u/s pH 6.5-7.0

JONES CHEMICAL